Managing for playability

Micah Woods

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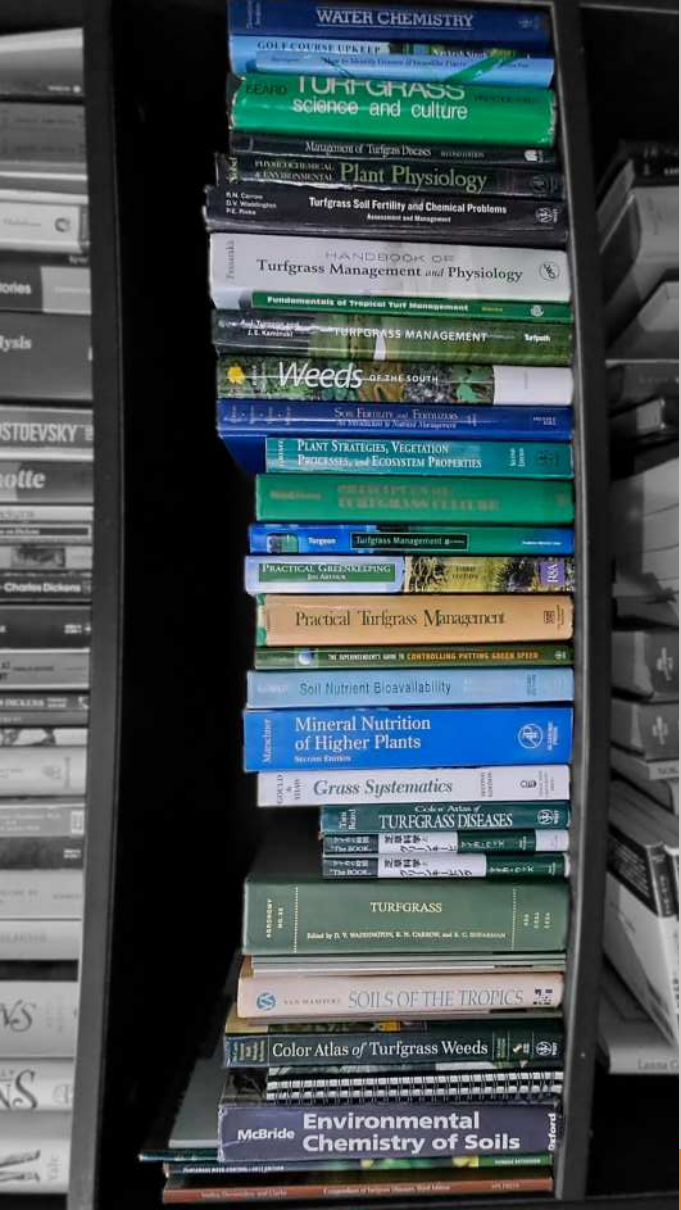
WATER CHEMISTRY
GOLF COURSE UPKEEP
TURFGRASS
science and culture
Management of Turfgrass Diseases
Plant Physiology
Turfgrass Soil Fertility and Chemical Problems
HANDBOOK OF
Turfgrass Management and Physiology
Fundamentals of Tropical Turf Management
TURFGRASS MANAGEMENT
Weeds OF THE SOUTH
Soil Fertility and Fertilizers
PLANT STRATEGIES, VEGETATION PROCESSES, and ECOSYSTEM PROPERTIES
Turfgrass Management
PRACTICAL GREENKEEPING
Practical Turfgrass Management
Soil Nutrient Bioavailability
Mineral Nutrition of Higher Plants
Grass Systematics
Color Atlas of TURFGRASS DISEASES
TURFGRASS
SOILS OF THE TROPICS
Color Atlas of Turfgrass Weeds
McBride
Environmental Chemistry of Soils

Chemical Control of Turfgrass Diseases 2024

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Turfgrasses under intensive management are often subject to outbreaks of infectious diseases. Diseases usually are most damaging when weather or cultural conditions favor the disease-causing agent but not plant growth and vigor. Cultural conditions that predispose turfgrass to diseases include close mowing, inadequate or excessive fertility, light or frequent irrigation, excessive thatch, poor drainage, and shade.

Good turf management practices often greatly reduce the impact of disease by promoting healthy plants that are better able to resist infections. Even under good management, however, diseases sometimes cause excessive damage to highly managed turfgrasses. The proper use of fungicides in these instances, in conjunction with implementing best cultural management practices that promote quality turf, can be an important part of an overall disease-management program.

Fungicides available for controlling turfgrass diseases in the United States and Canada are listed in tables 1 and 2. Specific application rates, safety precautions, and other important information are provided on the labels of the formulated products. Read these labels completely and carefully before using any fungicide.

Diseases in Home Lawns

This publication is intended for professional turfgrass managers who use fungicides as part of an overall disease-control program as described above. Homeowners with diseased lawns should obtain a copy of the University of Kentucky Cooperative Extension publication Disease Management in the Home Lawn (PPFS-OR-T-11), available at your county Extension office or on the web at http://plantpathology.ca.uky.edu/files/ppfs-or-t-11.pdf.
PPFS-OR-T-11 describes cultural practices that usually can alleviate infectious diseases in home lawns without the use of fungicides. Consider these limitations before using commercial fungicides:

- They are effective only against specific turfgrass diseases.
- They must be applied at the right time to be effective.
- They must be applied at the right rate to be safe and effective.
- They often must be applied repeatedly and in rotation.

For these reasons, fungicide use by homeowners generally is discouraged. Certain fungicides labeled for disease control may not be used on residential lawns; see product labels for such restrictions.

Because of Food Quality Protection Act considerations, chlorothalonil and iprodione are no longer labeled for use in home lawns. PCNB (pentachloronitrobenzene or quintozene) may also no longer be used on home lawns, as such use was voluntarily revoked by manufacturers.

If applying "granular" fungicides to home lawns, here are some guidelines to help improve results:

If disease is not yet evident, fungicides may be applied to foliage that is either wet or dry. In either case, wearing impermeable boots is recommended.

If disease is already active:

- For control of foliar diseases, apply the fungicide when foliage is wet so that it sticks to leaf blades when using a granular product.
- For control of root diseases, either apply it to dry foliage or apply it to wet foliage followed by immediate, light irrigation to wash the product into the topmost soil layer.

Contact and Systemic Fungicides

There are two general types of fungicides. Contact fungicides, sometimes called protectant fungicides, remain on plant surfaces after application and do not penetrate the plant tissue. Systemic or penetrant fungicides are those that are absorbed into the plant. Some systemic fungicides move within the plant only a short distance from the site of penetration; these fungicides are called localized penetrants. The dicarboximide fungicides are one example of this group. Some locally systemic fungicides simply cross the leaf blade from one leaf surface to the other but do not redistribute within the plant. In that case, they are called translaminar fungicides; trifloxystrobin is an example. Some systemic fungicides move within the water-conducting tissue (xylem), which takes them upward in the transpiration stream; downward mobility within the plant is limited. These fungicides are called xylem-mobile or acropetal systemics. Within this group, some fungicides are moderately mobile within plants, such as certain DMI fungicides. Others are highly mobile and move readily through the xylem. Examples of highly xylem-mobile systemics include thiophanate-methyl and mefenoxam. A third type of systemic fungicide is the phloem-mobile systemic, which moves bidirectionally (from leaves to roots and vice versa). Only one example of this type of systemic fungicide exists among turfgrass fungicides: the phosphonates, which include fosetyl-Al and the phosphites.

Systemic fungicides sometimes can suppress the fungus after it has infected the plant, whereas contact fungicides must be present on the plant's surfaces before infection begins to be effective.

Reducing summertime stress on putting greens

> *Raise mowing height …[increase] rolling frequency …Use foliar applications of soluble nitrogen at rates of 6–12 kg/ha every 10–14 days [that's 3–8 kg/ha/week]….Continue topdressing …and maintain a canopy full of sand.*

— from *Chemical Control of Turfgrass Diseases 2024*, multiple authors

Woods Performance System

- surface performance (speed, firmness)
- growth rate (ClipVol)
- nutrient supply (MLSN)
- total organic material (OM246)

Two Years of the KPMG Women's PGA Championship


18
PAR
4
YARDS
412
KPMG
PGA
OF AMERICA
LPGA
KPMG

June 2019

June 2026

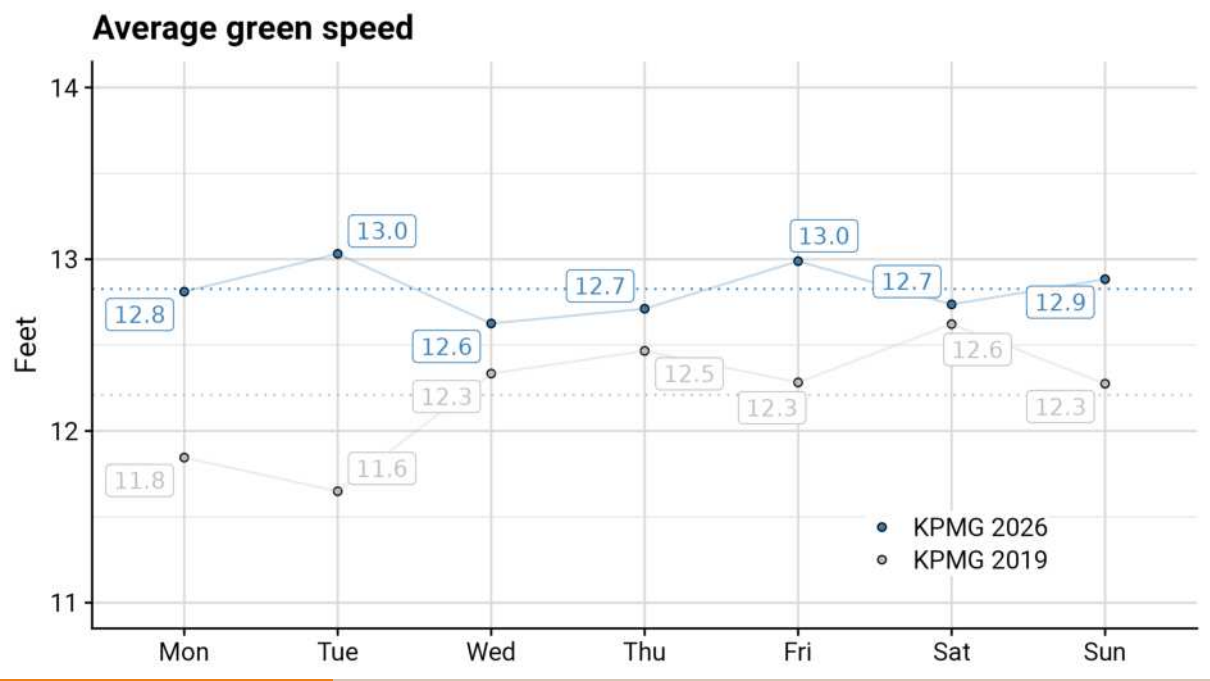
Tournament week maintenance

2019

- 2.8 mm bench setting
- Mon/Tue a.m. 1x cut + roll
- Wed–Sun a.m. 2x cut + roll

2026

- 2.9 mm bench setting
- Mon–Sun a.m. 1x cut
- Mon–Sat p.m. roll

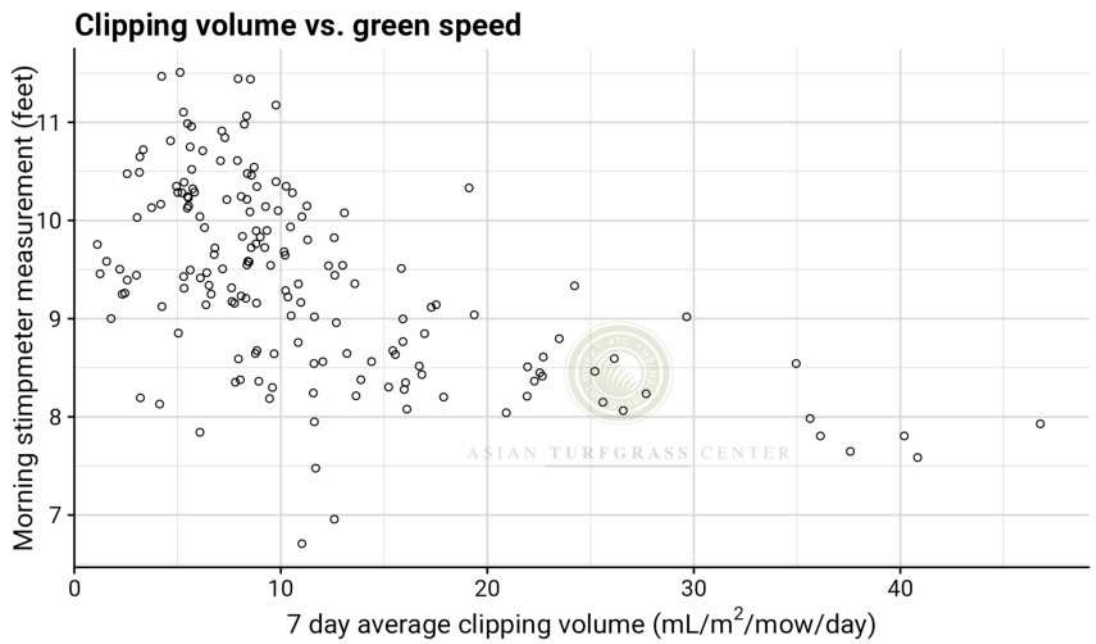

Average green speed
14
13
12
11
Feet
13.0
12.8
12.7
13.0
12.7
12.9
12.6
12.5
12.3
12.6
12.3
12.3
11.8
11.6
KPMG 2026
KPMG 2019
Mon
Tue
Wed
Thu
Fri
Sat
Sun

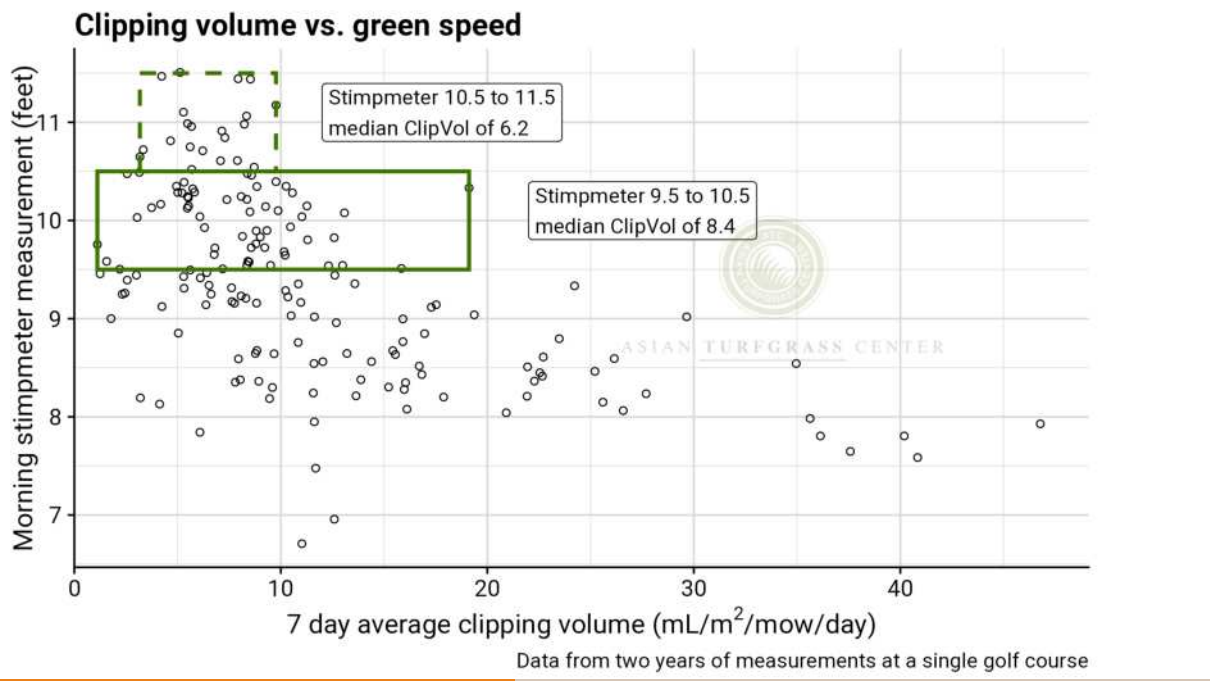
Growth rate

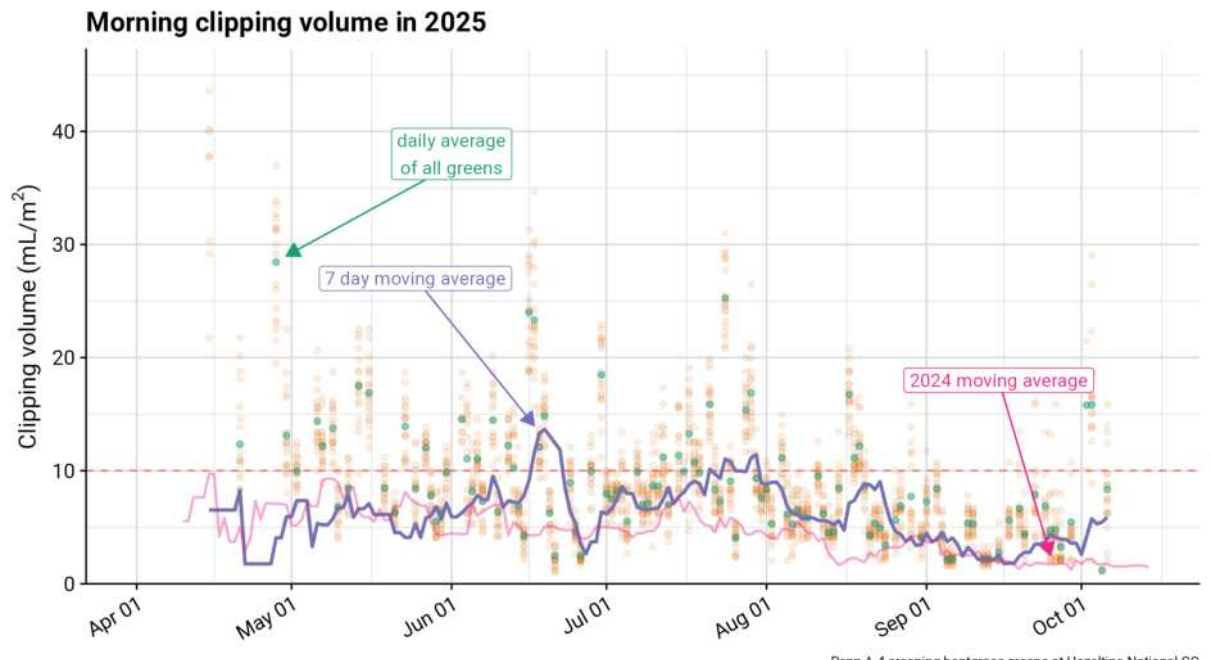
Video time stamp: 1 second

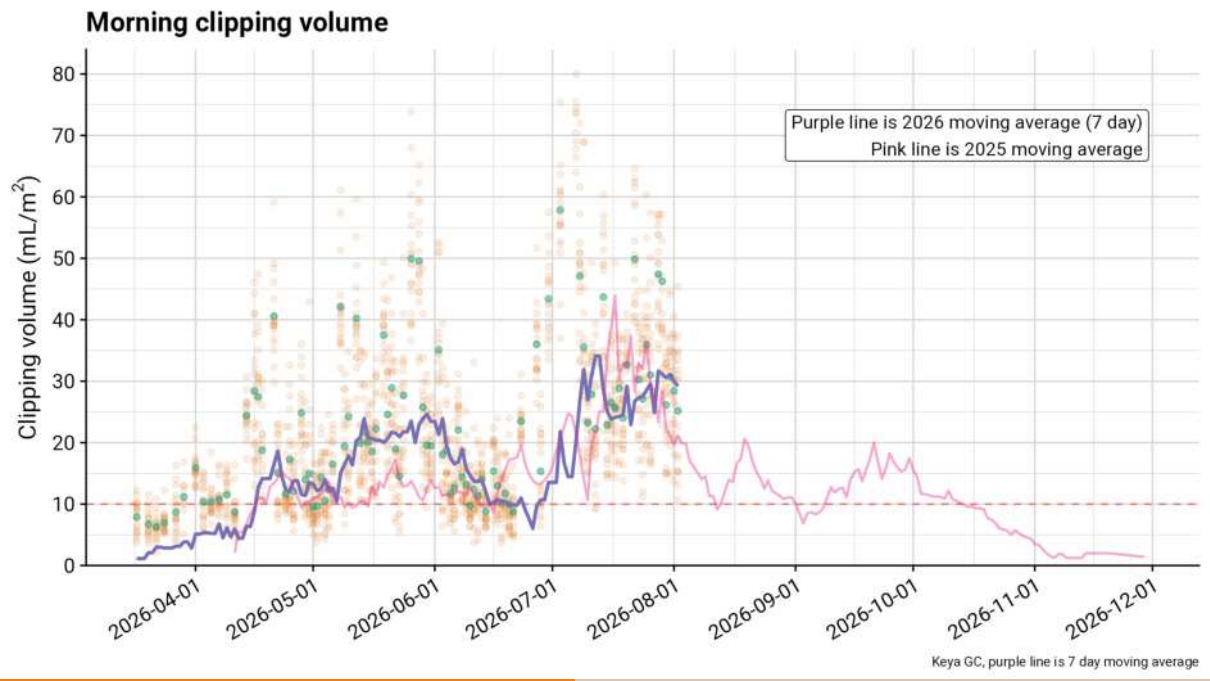
Video time stamp: 4 seconds

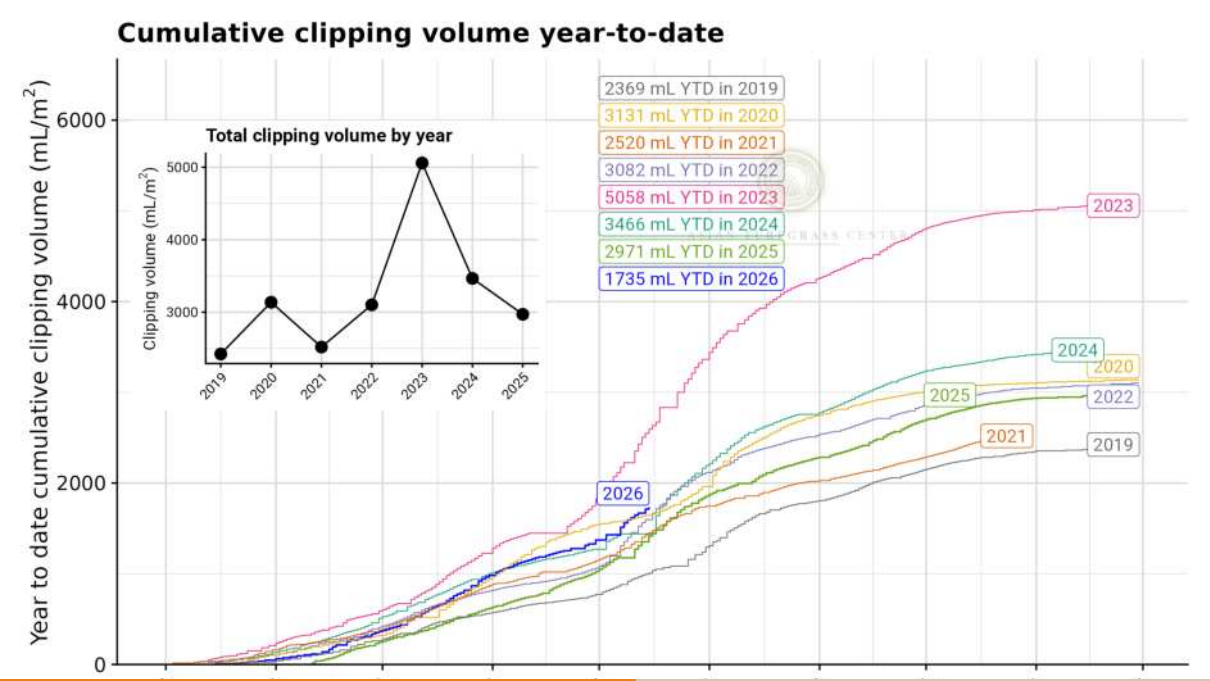
Video time stamp: 10 seconds


Clipping volume vs. green speed
Morning stimpmeter measurement (feet)
11
10
9
8
7
0
10
20
30
40
7 day average clipping volume (mL/m^2/mow/day)
ASIAN TURFGRASS CENTER
Data from two years of measurements at a single golf course

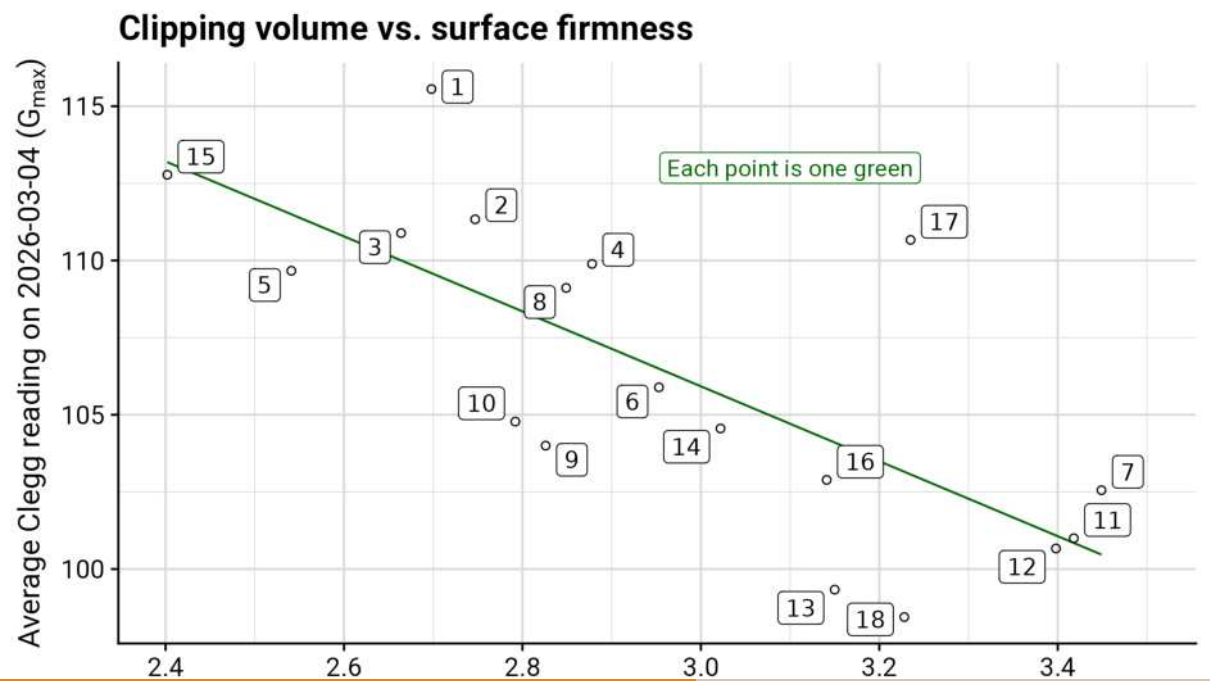



Morning clipping volume in 2025
daily average of all greens
7 day moving average
2024 moving average
Clipping volume (mL/m^2)
0
10
20
30
40
Apr 01
May 01
Jun 01
Jul 01
Aug 01
Sep 01
Oct 01
Penn A-4 creeping bentgrass greens at Hazeltine National GC


Morning clipping volume
Purple line is 2026 moving average (7 day)
Pink line is 2025 moving average
Clipping volume (mL/m^2)
0
10
20
30
40
50
60
70
80
2026-04-01
2026-05-01
2026-06-01
2026-07-01
2026-08-01
2026-09-01
2026-10-01
2026-11-01
2026-12-01
Keya GC, purple line is 7 day moving average


Cumulative clipping volume year-to-date
Year to date cumulative clipping volume (mL/m^2)
6000
4000
2000
0
2369 mL YTD in 2019
3131 mL YTD in 2020
2520 mL YTD in 2021
3082 mL YTD in 2022
5058 mL YTD in 2023
3466 mL YTD in 2024
2971 mL YTD in 2025
1735 mL YTD in 2026
2023
2024
2020
2025
2022
2021
2019
2026
Total clipping volume by year
Clipping volume (mL/m^2)
5000
4000
3000
2019
2020
2021
2022
2023
2024
2025



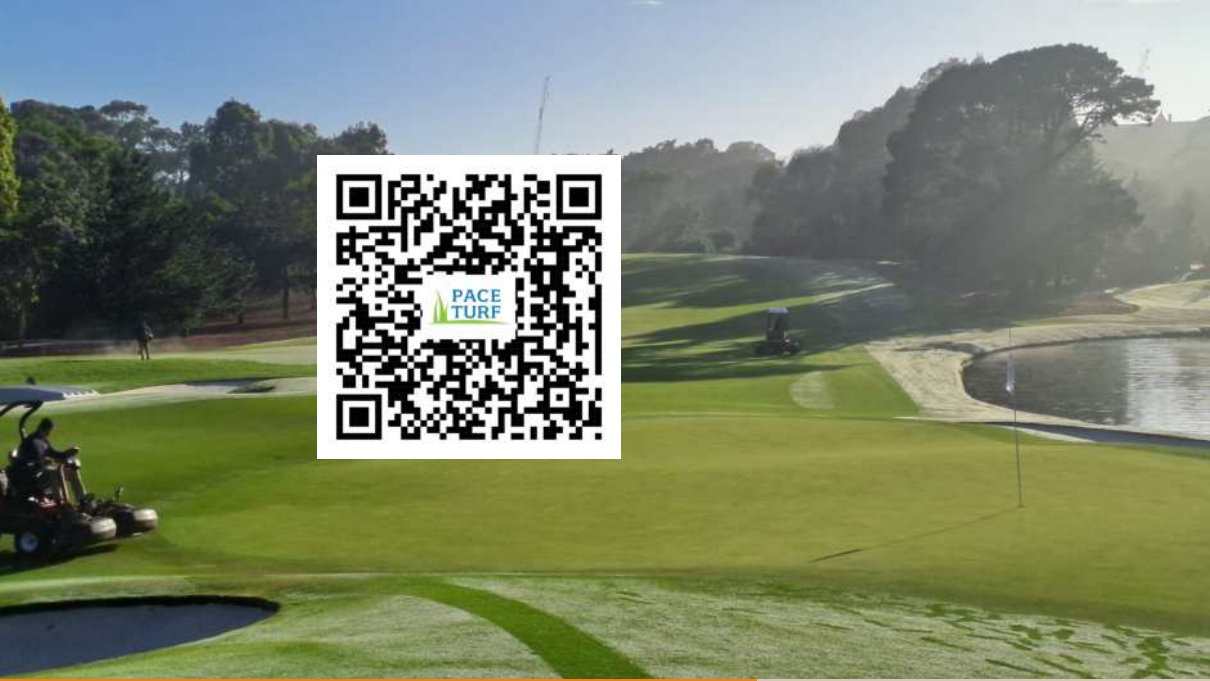

Clipping volume vs. surface firmness
Average Clegg reading on 2026-03-04 (G_{max})
115
110
105
100
2.4
2.6
2.8
3.0
3.2
3.4
Each point is one green
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18

One Bucket at a Time

A guide to rapid measurement of clipping volume with various permutations, applications, and implications

Micah Woods

Contents


PACE
TURF

Nutrient supply

We want to ensure that the grass is supplied with all the nutrients it can use. This quantity is the minimum amount to supply.

However, adding more nutrients than the grass can use, or than the soil can hold, is a waste. Adding enough to ensure that grass is supplied with all the nutrients it can use is also the maximum amount to supply.

The minimum and the maximum amount to apply are the same. I call this the right amount, or just what the grass requires.

In the case of no soil testing

With no soil test, it makes sense to supply 100% of what the grass can use.

The amount the grass grows controls how much it uses

The amount the grass grows controls how much it uses

When there is a soil test

It makes sense to supply the amount the grass uses that it can't get from the soil. That is, *the grass use* minus *the soil test*.

MLSN is an extra amount to keep in reserve

Reference

September, 2014

Minimum Levels for Sustainable Nutrition Soil Guidelines

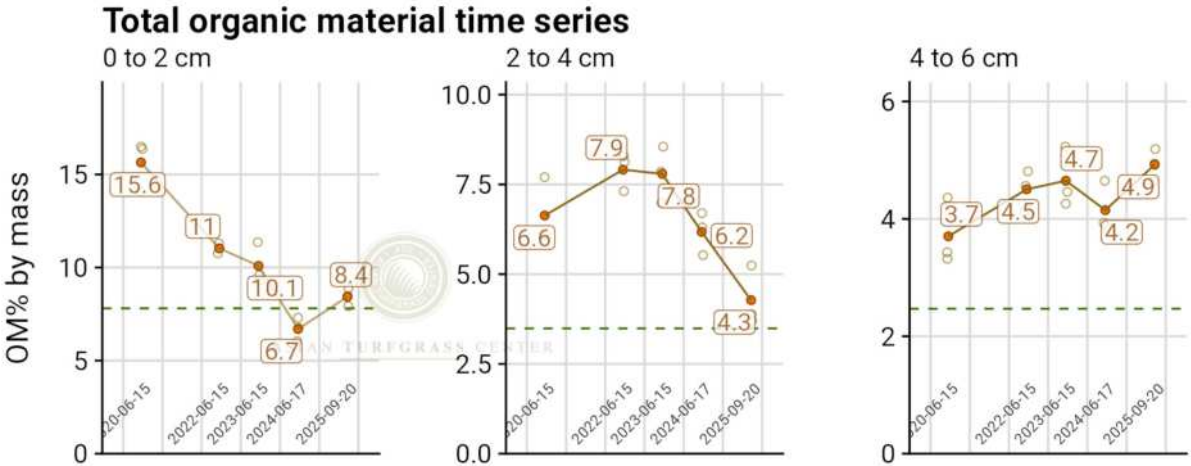
The Minimum Level for Sustainable Nutrition (MLSN) Guideline is a new, more sustainable approach to managing soil nutrient levels that can help you to decrease fertilizer inputs and costs, while still maintaining desired turf quality and playability levels. The MLSN guidelines were developed in a joint project between PACE Turf and the Asian Turfgrass Center. All soil analyses were conducted at Brookside Laboratories, New Bremen, OH.

	MLSN Soil Guideline
pH	>5.5
Potassium (K ppm)	37
Phosphorus (P ppm)	21
Calcium (Ca ppm)	331
Magnesium (Mg ppm)	47
Sulfur as sulfate (S ppm)	7

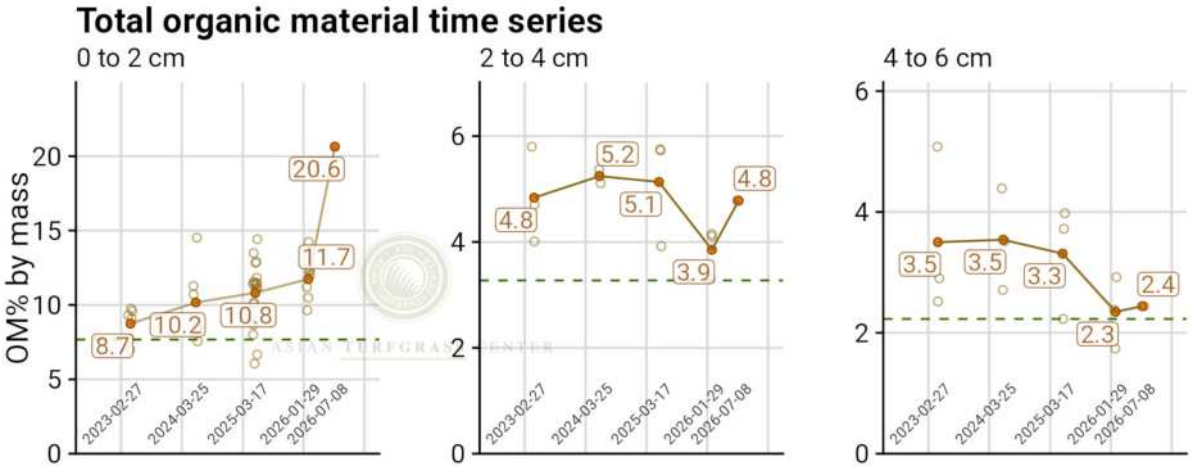
Let’s make sure we have enough beer

OM246

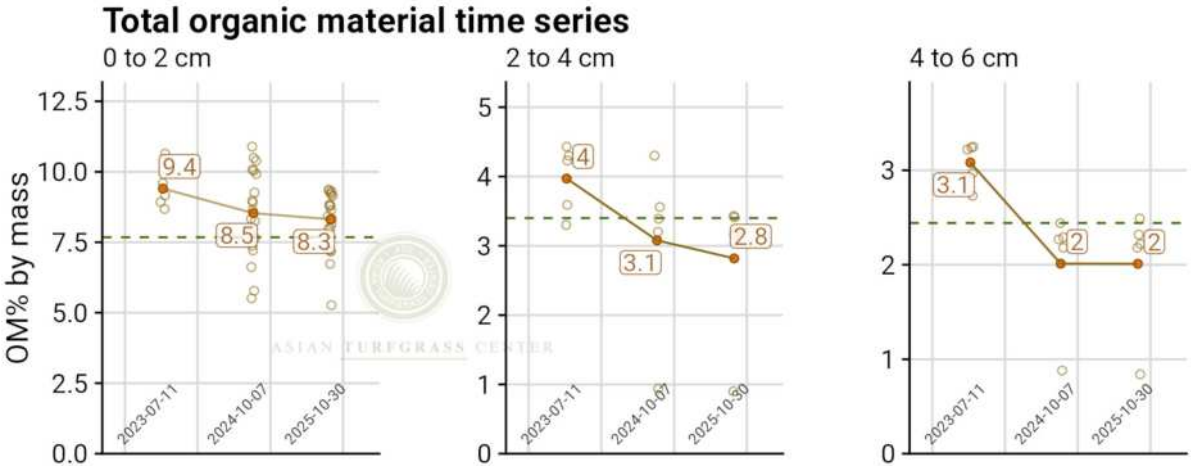

0 to 0.8 inches
0 to 2 cm OM2
0.8 to 1.6 inches
2 to 4 cm OM4
1.6 to 2.4 inches
4 to 6 cm OM6



The horizontal dashed line marks the average value (50th percentile) of all bent-Poa samples at that depth.



The horizontal dashed line marks the average value (50th percentile) of all bermudagrass samples at that depth.



The horizontal dashed line marks the average value (50th percentile) of all bent-Poa samples at that depth.

- surface performance (speed, firmness)
- growth rate (ClipVol)
- nutrient supply (MLSN)
- total organic material (OM246)

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